AMENDMENTS TO THE CLAIMS

Please amend Claims 1, 12, 26-28, and 31 as follows and cancel Claim 11, without prejudice or disclaimer to continued examination on the merits:

1. (currently amended) A node comprising:

a series connection of elements E_i, i =l, 2, ... N, where N is greater than 1, forming a first optical path, where each of said elements E_i injects an optical signal of band Λ_i, and where Λ_i is disjoint from Λ_j for all $i \neq j$;

a series connection of elements F_i, i=l, 2, ... N, forming a second optical path, where each of said elements F_i extracts an optical signal of band Λ_i;

a plurality of transmitters T_i, i=l, 2, ... N, coupled to said elements E_i on a one to one basis; and

a plurality of a receivers R_i, i=l, 2, ... N, coupled to said elements F_i on a one to one basis;

wherein a collection of elements that includes element E_i, element F_i, transmitter T_i, and receiver R_i are housed in a single equipment module M_i, resulting in said node comprising a serially interconnected set of modules M_i, i=l, 2, ... N, with said interconnected set having

an add-in node input port that is connected to module M_1,

a drop-out node output port that is connected to module M_1,

an add-in node output port that is connected to module M_N, and

a drop-out node input port that is connected to module M_N.

2. (original) The node of claim 1 where said first optical path and said second optical path are physically separate paths.

3. (original) The node of claim 1 where each of said bands, Λ_i, is a narrow band that carries a single channel of communication.

4. (original) The node of claim 1 where each of said bands, Λ_i, is substantially a single wavelength.

5. (original) The node of claim 1 where at least one of said elements E_k, that injects band Λ_k carries a plurality of independent channels of communication.

6. (original) The node of claim 1 where each of said bands, Λ_i, comprises a plurality of narrow bands centered about wavelengths λ_j, j=l, 2, ... M, where M is an integer greater than 1, and each of said narrow bands constitutes an information channel.

7. (original) The node of claim 6 where said narrow bands are composed of essentially a single wavelength, where wavelength λ_j is different from λ_k for all $j \neq k$.

8. (original) The node of claim 5 where at least one of said transmitters, T_k, includes an optical multiplexer that combines optical signals, each of said signals constituting one channel of communication, to form an optical signal of band Λ_k.

9. (original) The node of claim 8 where said multiplexer is a multi-level multiplexer.

10. (original) The node of claim 1 wherein a collection of elements that includes element E_i, element F_i, transmitter T_i, and receiver R_i are housed in a single equipment module M_i, resulting in said node comprising a plurality of modules M_i, i=l, 2, ... N that are serially connected.

11. (canceleed)

12. (currently amended) The node of claim [[11]] <u>1</u> where said add-in node input port, and said drop-out node output port are in close physical proximity to each other, and said add-in node output port, and said drop-out node input port are in close physical proximity to each other.

13. (original) The node of claim 1 where

said elements E_i and F_i, i=l, 2, ... N, are housed in a single equipment module that includes ports P_i, i=l, 2, ... N, with each P_k being coupled to elements E_k and F_k; and

transmitter T_i and receiver R_i form a conversion module C_i that is outside said single equipment module, thereby resulting in a plurality of conversion modules C_i, i=l, 2, ... N, with each conversion module C_k being coupled to port P_k, for all values of k=l, 2, … N.

14. (original) The node of claim 1 where

each element E_i has an input port and an output port, each element E_i has its output port connected to input port of element E_{i+1}, the input port of element E_1 forms an add-in node input port, and the input port of element E_N forms an add-in node output port, and

each element F_i has an input port and an output port, each element F_i has its output port connected to input port of element F_{i-1} the input port of element F_N forms a drop-out node input port, and the input port of element F_1 forms a drop-out node output port.

15. (previously presented) The node of claim 1, located in a first communication place, further comprising:

a second node, in a second communication place that is remote from said first communication place, comprising

a series connection of elements E'_k, k=l, 2, … N', where N' is greater than 1, forming a first optical path within said second node, where each of said elements E'_k injects an optical signal of band Λ_k, and where Λ_k is disjoint from Λ_m for all $k \neq m$;

a series connection of elements F'_k, k=l, 2, … N', forming a second optical path within said second node, where each of said elements F'_k extracts an optical signal of band Λ_k;

a plurality of transmitters T'_k, k=l, 2, … N, coupled to said elements E'_k on a one to one basis;

a plurality of a receivers R'_k, k=l, 2, … N, coupled to said elements F'_k on a one to one basis; and

a bi-directional optical path that interconnects said node in said first communication place with said second node in said second communication place.

16. (previously presented) The node of claim 15 where N=N' and each bandwidth Λ_k in said node in said second communication place corresponds, and is substantially identical, to one bandwidth Λ_i in said first communication place.

17. (previously presented) The node of claim 15 further including a third node, in a third communication place that is remote from both said first communication place and said second communication place, said third node comprising:

a series connection of elements E''_n, n =1, 2,... N", where N" is greater than 1, forming a first optical path in said third node, where each of said elements E''_n injects an optical signal of band Λ_n, and where Λ_n is disjoint from Λ_o for all $n \neq o$;

a series connection of elements F''_n, n=l, 2, ... N', forming a first optical path, where each of said elements F''_n extracts an optical signal of band Λ_n;

a plurality of transmitters T''_n, n=l, 2, ... N', coupled to said elements E''_n on a one to one basis; and

a plurality of receivers R''_n, n=l, 2, ... N', coupled to said elements F''_n on a one to one basis; and

a bi-directional optical path that interconnects said second node in said second communication place with said third node in said third communication place.

18. (original) The node of claim 17 where at least one band in said node in said first communication place, Λ_i, has no matching band Λ_k in said second communication place.

19. (original) The node of claim 17 where at least one band in said node in said first communication place, Λ_i , has a matching band Λ_k in said second communication place.

20. (previously presented) The node of claim 15 further including a third communication place that is remote from both said first communication place and said second communication place, said third communication place comprising:

a third node serially connected to a fourth node, where said third node comprises a series connection of elements E''_n, n=1, 2, ... N", where N" is greater than 1, forming a first optical path in said third node, where each of said elements E''_n injects an optical signal of band Λ_n, and where Λ_n is disjoint from Λ_o for all $n \neq o$;

a series connection of elements F''_n, n=l, 2, ... N", forming a first optical path, where each of said elements F''_n extracts an optical signal of band Λ_n;

a plurality of transmitters T''_n, n=l, 2, ...N', coupled to said elements E''_n on a one to one basis; and

a plurality of receivers R''_n, n=l, 2, ... N', coupled to said elements F''_n on a one to one basis; and

said fourth node comprises

a series connection of elements E'''_p, p =1, 2, ... N''', where N''' is greater than 1, forming a first optical path in said third node, where each of said elements E'''_p injects an optical signal of band Λ_p, and where Λ_p is disjoint from Λ_q for all $p \neq q$;

a series connection of elements F'''_p, p =1, 2, ... N''', forming a first optical path, where each of said elements F'''_p extracts an optical signal of band Λ_p;

a plurality of transmitters T'''_p, p=l, 2, ... N''', coupled to said elements E'''_p on a one to one basis; and

a plurality of receivers R'''_p, p=l, 2, ... N''', coupled to said elements F'''_p on a one to one basis.

21. (original) The node of claim 20 where at least one of said bands Λ_i is equal to one of said bands Λ_n.

22. (original) The node of claim 20 where at least one of said bands Λ_i is equal to one of said bands Λ_n and also to one of said bands Λ_p.

23. (original) An arrangement comprising:

a first node as defined in claim 1, in a first location,

a second node as defined in claim 1, in a second location that is remote from said first location; and

a bi-directional optical connection between said first node and said second node.

24. (original) The arrangement of claim 23 where said optical connection comprises an optical path from said add-in node output port of said first node to said drop-out node input port of said second node, and an optical path from said add-in node output port of said second node to said drop-out node input port of said first node.

25. (previously presented) A node comprising:

a first series connection of N elements, where N is greater than 1, forming a first optical path in a first node, where each of the elements in said first series injects an optical signal of a preselected band of wavelengths, and where bands of wavelengths of the different elements in said first series are disjoint from each other;

a second series connection of N elements, forming a second optical path in said first node that is disjoint from said first optical path, where each of the elements in said second series extracts an optical signal of a preselected band of wavelengths, and where bands of wavelengths of the different elements in said second series are the same as the bands of wavelengths of the different elements in said first series;

a plurality of transmitter elements, with each one of said transmitter elements being coupled to a different one of said N elements in said first series connection of N elements; and

a plurality of receiver elements , with each one of said receiver elements being coupled to a different one of said N elements in said second series connection of N elements.

26. (currently amended) An arrangement comprising:

A first module that includes

a) an add-in port that leads to a set of elements that add an optical signal of a first wavelength,

b) an add-out port that outputs an optical signal from said set of elements that add an optical signal,

c) a drop-in port that leads to a set of elements that extract an optical signal of said first wavelength, and

d) a drop-out port that outputs an optical signal from said set of elements that extract an optical signal;

A second module that includes

a) an add-in port that leads to a set of elements that add an optical signal of a second wavelength,

b) an add-out port that outputs an optical signal from said set of elements that add an optical signal,

c) a drop-in port that leads to a set of elements that extract an optical signal of said second wavelength, and

d) a drop-out port that outputs an optical signal from said set of elements that extract an optical signal; and

~~connection elements~~ connections that optically connect the add-out port of said first module to the add-in port of said second module, and the drop-out port of said second module is optically connected to the drop-in port of said first module.

27. (currently amended) The arrangement of claim 26 further comprising:

A third module that includes

a) an add-in port that leads to a set of elements that add an optical signal of a second wavelength,

b) an add-out port that outputs an optical signal from said set of elements that add an optical signal,

c) a drop-in port that leads to a set of elements that extract an optical signal of said second wavelength, and

d) a drop-out port that outputs an optical signal from said set of elements that extract an optical signal;

A fourth module that includes

a) an add-in port that leads to a set of elements that add an optical signal of a first wavelength,

b) an add-out port that outputs an optical signal from said set of elements that add an optical signal,

c) a drop-in port that leads to a set of elements that extract an optical signal of said first wavelength, and

d) a drop-out port that outputs an optical signal from said set of elements that extract an optical signal; and

~~connection elements~~ connections that optically connect the add-out port of said third module to the add-in port of said fourth module, and the drop-out port of said fourth module is optically connected to the drop-in of said third module.

28. (currently amended) The arrangement of claim 26 further comprising:

A third module that includes

a) an add-in port that leads to a set of elements that add an optical signal of a first wavelength,

b) an add-out port that outputs an optical signal from said set of elements that add an optical signal,

c) a drop-in port that leads to a set of elements that extract an optical signal of said first wavelength, and

d) a drop-out port that outputs an optical signal from said set of elements that extract an optical signal;

A fourth module that includes

a) an add-in port that leads to a set of elements that add an optical signal of a second wavelength,

b) an add-out port that outputs an optical signal from said set of elements that add an optical signal,

c) a drop-in port that leads to a set of elements that extract an optical signal of said second wavelength, and

d) a drop-out port that outputs an optical signal from said set of elements that extract an optical signal; and

~~connection elements~~ connections that optically connect the add-out port of said third module to the add-in port of said fourth module, and the drop-out port of said fourth module is optically connected to the drop-in of said third module.

29. (previously presented) A node comprising:

a first sub-node serially connected to a second sub-node, where said first sub-node comprises

a series connection of elements E''_n, $n = 1, 2, \ldots N''$, where N" is greater than 1, forming a first optical path in said first node, where each of said elements E''_n injects an optical signal of band Λ_n, and where Λ_n is disjoint from Λ_o for all $n \neq o$;

a series connection of elements F''_n, $n=1, 2, \ldots N''$, forming a first optical path, where each of said elements F''_n extracts an optical signal of band Λ_n;

a plurality of transmitters T''_n, $n=1, 2, \ldots N''$, coupled to said elements E''_n on a one to one basis; and

a plurality of receivers R''_n, $n=1, 2, \ldots N''$, coupled to said elements F''_n on a one to one basis; and

said second sub-node comprises

a series connection of elements E'''_p, $p = 1, 2 \ldots N'''$, where N''' is greater than 1, forming a first optical path in said second sub-node, where each of said elements E'''_p injects an optical signal of band Λ_p, and where Λ_p is disjoint from Λ_q for all $p \neq q$;

a series connection of elements F'''_p, $p = 1, 2, \ldots N'''$, forming a first optical path, where each of said elements F'''_p extracts an optical signal of band Λ_p;

a plurality of transmitters T'''_n, $n=1, 2, \ldots N'''$, coupled to said elements E'''_n on a one to one basis; and

a plurality of receivers R'''_n, $n=1, 2, \ldots N'''$, coupled to said elements F'''_n on a one to one basis; and

where at least one of said bands Λ_n is equal to one of said bands Λ_p.

30. (previously presented) An arrangement comprising a plurality of nodes as defined in claim 1, said plurality of nodes interconnected to form a ring.

31. (currently amended) A node comprising:

a first optical path composed of a series connection of elements E_i, i=l, 2, ... N, where N is greater than 1, where each of said elements E_i injects an optical signal of band Λ_i, and where Λ_i is disjoint from Λ_j for all i≠j, followed by a series connection of elements F_j, j =1, 2, ... M, where each of said elements F_j extracts an optical signal of band Λ_j, and where at least one Λ_i is equal to a Λ_i; and

a second optical path, disjoint from said first optical path, composed of a series connection of elements F_i, i=1, 2, ... N, followed by series connection of elements E_j, j=l, 2 ,... M;

a plurality of transmitters T_i, i=l, 2, ... N, coupled to said elements E_i on a one to one basis;

a plurality of transmitters T_j, j=l, 2, ... M, coupled to said elements E_j on a one to one basis

a plurality of receivers R_i, i=l, 2, ... N, coupled to said elements F_i on a one to one basis; and

a plurality of receivers R_j, j=l, 2, ... M, coupled to said elements F_j on a one to one basis;

wherein a collection of elements that includes element E_i, element F_i, transmitter T_i, and receiver R_i are housed in a single equipment module M_i, resulting in said node comprising a serially interconnected set of modules M_i, i=l, 2, ... N, with said interconnected set having

an add-in node input port that is connected to module M_1,

a drop-out node output port that is connected to module M_1,

an add-in node output port that is connected to module M_N, and

a drop-out node input port that is connected to module M_N.

32. (previously presented) A node, comprising:

a) a first module having an add-in port that leads to a set of elements that add an optical signal of a first wavelength, an add-out port that outputs an optical signal from said set of elements that add an optical signal, a drop-in port that leads to a set of elements that extract an optical signal of said first wavelength, and a drop-out port that

outputs an optical signal from said set of elements that extract an optical signal;

b) said add-out port is physically disposed directly adjacent said drop-in port such that no other port is positioned between said add-out port and said drop-in port;

c) said add-in port is physically disposed directly adjacent said drop-out port such that no other port is positioned between said add-in port and said drop-out port.

33. (previously presented) A node as set forth in Claim 32, further including:

a) second module having an add-in port that leads to a set of elements that add an optical signal of a second wavelength, an add-out port that outputs an optical signal from said set of elements that add an optical signal, a drop-in port that leads to a set of elements that extract an optical signal of said second wavelength, and a drop-out port that outputs an optical signal from said set of elements that extract an optical signal;

b) said add-out port is physically disposed directly adjacent said drop-in port such that no other port is positioned between said add-out port and said drop-in port; and,

c) connection elements that optically connect the add-out port of said first module to the add-in port of said second module, and the drop-out port of said second module is optically connected to the drop-in port of said first module.

34. (previously presented) A node as set forth in Claim 33, wherein:

a) each of said first and second modules include first and second ends, said add-in port, said add-out port, said drop-in port and said drop-out port of each of said first and second modules are physically disposed adjacent the corresponding first end of said first and second modules and removed from the corresponding second end of said first and second modules.

35. (previously presented) A node as set forth in Claim 34, wherein:

a) said add-out ports of said first and second modules are physically spaced less than two inches from the corresponding drop-in ports of said first and second modules; and,

said add-in ports of said first and second modules are physically spaced less than two inches from the corresponding drop-out ports of said first and second modules.